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Translating science for decision makers: experiences from Parliament and industry

Centre for Environmental Policy, Imperial College London

August 2018

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Dept. Architecture and Civil Engineering, University of Bath

Image: Diliff, CC BY-SA 2.5

Contents

- Introduction
- Translating Science
- Focus on: Science in Parliament
- Examples from Parliament and industry
- Conclusions

Image: Diliff, CC BY-SA 2.5

Introduction

Now:

- **Lecturer in Building Environmental Engineering,** Dept. Architecture and Civil Engineering, University of Bath
- Member of **EPSRC Engineering Early Career Forum**

Previously:

- **Senior Consultant** then **Director** of companies in Bristol, doing energy and environmental management for industry and public sector, particularly in the built environment
- **Scientific Adviser – Energy**, Parliamentary Office of Science and Technology, Westminster
- **MEng, PhD** and **Post-Doctoral Research Officer** in Mechanical Engineering, University of Bath
  - Thermodynamic and life cycle carbon performance of microgeneration for buildings
  - SUPERGEN Highly Distributed Power Systems Consortium
- **Mechanical Engineer** in remote parts of Canada & Mexico

Awards:

- **George Stephenson Medal 2009** for Best Original Paper (IMechE)
- **International Visitor Leadership Programme – Climate Change and Renewable Energy** (US State Department)

My Research Interests

Energy engineering and **sustainability assessment** in the built environment:

- **Distributed energy technologies,** including **thermal energy storage**
- **Energy management** and **resource efficiency** in buildings
- Development and use of **sustainability assessment methods** to guide design and decision making, including:
  - life cycle assessment (LCA);
  - carbon footprinting;
  - embodied and operational energy analysis.

Teaching:

- Conventional and low-carbon heating and electricity technologies; thermodynamics of energy supply to buildings; low-energy building design

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Translating Science

Translating science for decision makers is challenging, both in policy and business worlds.

It's also essential for maximising the impact of academic work.

How best can I summarise my work for people without a background in my topic?
How can I communicate results simply and succinctly without ignoring complexity and uncertainty?
How should I present appropriate caveats without undermining my work?

Question for you:

What do you feel is the most important factor is communicating successfully to politicians and business people?

Translating Science

Understand your audience; find best avenues to engage; be relevant to them; grab their attention

Question	Parliament	Business
What are their aims?	Represent constituents? Become a minister? Be involved in Select Committees? Maintain seat in future elections?	Leadership/promotion? Meet regulatory requirements? Gain customers? Reduce risks?
What and who are their sources of pressure?	Constituents? Government whips? Legislative programme? **Available time?**	Customers? Board of Directors? Parent company? Budget constraints? **Available time?**
What are their timescales; key dates in a year?	Legislative programme; select committee enquiry deadlines; parliamentary dates, summer recess, election timescales	Budget year end, regular reporting timescales (e.g. quarterly, annually)
Where do they go for information?	Select Committee reports? POST? Commons Library? Mainstream media?	Professional magazines? National/international standards? Mainstream media?

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Parliament vs Government

UK: ‘fusion of powers’

The Houses of Parliament (‘The Legislature’)

650 MPs in House of Commons

Approx. 400 active Peers in House of Lords

Government (‘The Executive’)

The Prime Minister appoints, from both Houses, approx. 120 government ministers, who lead government departments. So the Executive is formed by part of the Legislature.

Images: www.parliament.uk

Parliament vs Government

UK: ‘fusion of powers’

Parliament	Government
‘The Legislature’	‘The Executive’
• Examines and approves legislation (most of which is drafted by government) • Checks and approves government spending and taxation • Scrutinises the wider work of government • Debates topical issues	• Develops and implements policy • Drafts legislation

Role of Parliament

Legislation

Scrutiny of Government

Public Debate

Science in Parliament

What do MPs and Peers say about science?

2009 survey of 50-60 MPs and Peers:

“Science impinges on a great many of our debates and decisions”

“Science affects our constituents’ lives in many respects”

“So much legislation bears on science or science regulation or innovation”

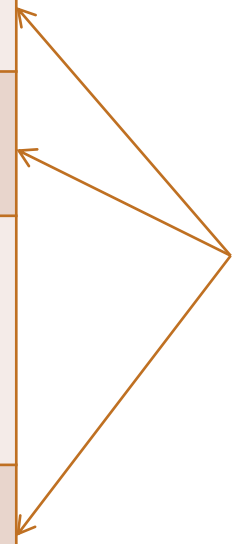
“Impartial evidence is always good, particularly on issues where parliamentarians don’t come with their own expertise or knowledge and especially where they may be intimidated by the subject matter”

“MPs get bombarded with lobbying material from all sorts of people particularly when there is a bill coming before parliament”

→ Parliamentarians are busy people who appreciate *“information which is easily digestible in a language we understand and usable in a language we can present”*

Science in Parliament

Official	Select Committees
	Parliamentary Office of Science and Technology (POST)
	Libraries (particularly Science and Environment section in Commons)
Interest Group	All Party and Associate Parliamentary Groups



You can engage with all of these…

Particularly these

Select Committees

House of Commons committees include:

- Departmental Committees (e.g. BEIS)
- Cross-Dept Committees (e.g. Environmental Audit)
- Joint Committees for pre-legislative scrutiny

House of Lords:

- Do not shadow govt. departments. Specialist subjects with more time
- E.g. Science and Technology Committee

Image: www.parliament.uk

Select Committee Process

Call for written evidence

Image: www.parliament.uk

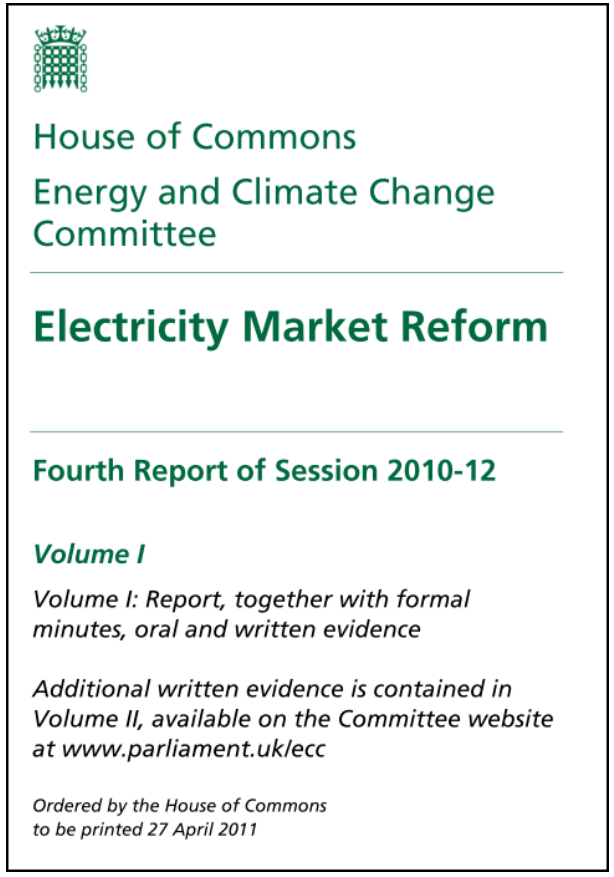
Select Committee Process

Oral evidence sessions

Image: www.parliament.uk

Select Committee Process

Report and government response



House of Commons

Energy and Climate Change Committee

Electricity Market Reform

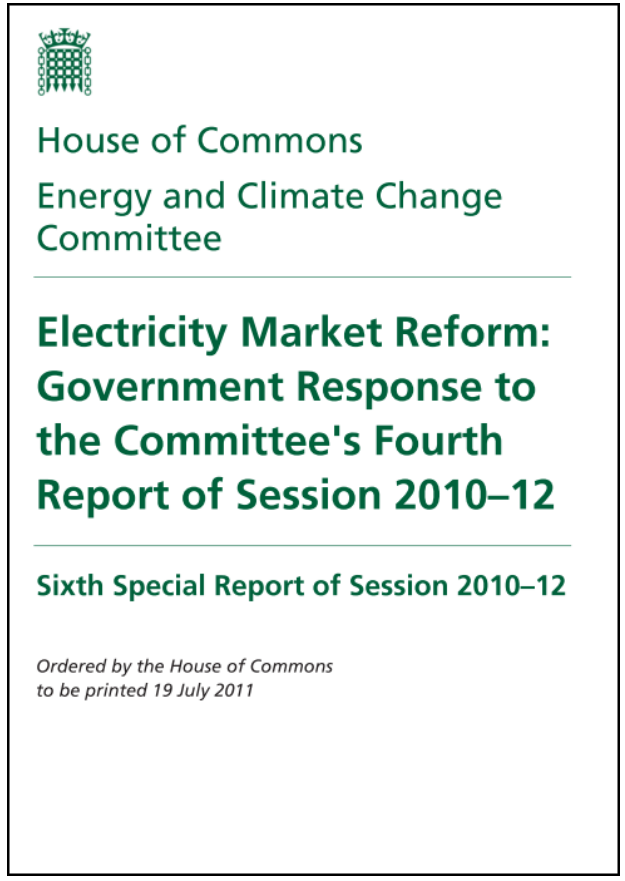
Fourth Report of Session 2010-12

Volume I

Volume I: Report, together with formal minutes, oral and written evidence

Additional written evidence is contained in Volume II, available on the Committee website at www.parliament.uk/ecc

Ordered by the House of Commons to be printed 27 April 2011



House of Commons

Energy and Climate Change Committee

Electricity Market Reform: Government Response to the Committee's Fourth Report of Session 2010–12

Sixth Special Report of Session 2010–12

Ordered by the House of Commons to be printed 19 July 2011

Parliamentary Office of Science and Technology

- Serves both Houses of Parliament
- Provides independent and accessible analysis of public policy issues related to science and technology
- Quarterly Board Meetings to determine work programme
- Approx. 12 staff plus numerous Fellowships
- Work includes producing POSTnotes and supporting Select Committees
- **POSTnotes depend on engagement with people in academia,** industry, government and NGOs

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Examples

Today's examples

Parliament

Select Committees

- Seconded to Energy and Climate Change Committee to support pre-legislative scrutiny of 2012 Energy Bill (electricity market reform)

POSTnotes included:

- Heat Pumps
- Carbon Footprint of Electricity Generation
- Measuring Energy Security
- Energy Efficiency
- Biofuels from Algae
- Energy Use Behaviour Change
- Unconventional Gas (e.g. Shale Gas)
- Future Electricity Networks

Industrial (with each type of audience)

Energy and environmental management (e.g. GWR)

- Board of Directors; facilities and station managers

Organisational carbon footprints and science-based carbon targets (e.g. FirstGroup)

- Frontline staff; Head of Environment; Board of Directors

Embodied carbon assessment of architectural design

- Planning authorities

Embodied carbon of 200+ grocery products

- Consortium of producers and retailers

Life cycle assessment, and LCA peer reviews, of products for small to global companies

- Marketing teams; Engineering teams; Board of Directors

“A good briefing….”

Is concise (POSTnotes are four pages)

Has a clear structure and narrative

- Overview (relevance, timeliness, main issues)
- Clear signposting to aid scanning

Doesn’t assume too much prior knowledge

Minimises jargon and acronyms

Is impartial and balanced (hence POSTnote peer review)

Highlights where is there consensus and where there is ongoing debate

Uncertainty

Uncertainty drives science forwards...

But can lead policy makers and businesses to indecision

Perhaps the most important thing to communicate is that **uncertainty does not equate to flawed science**

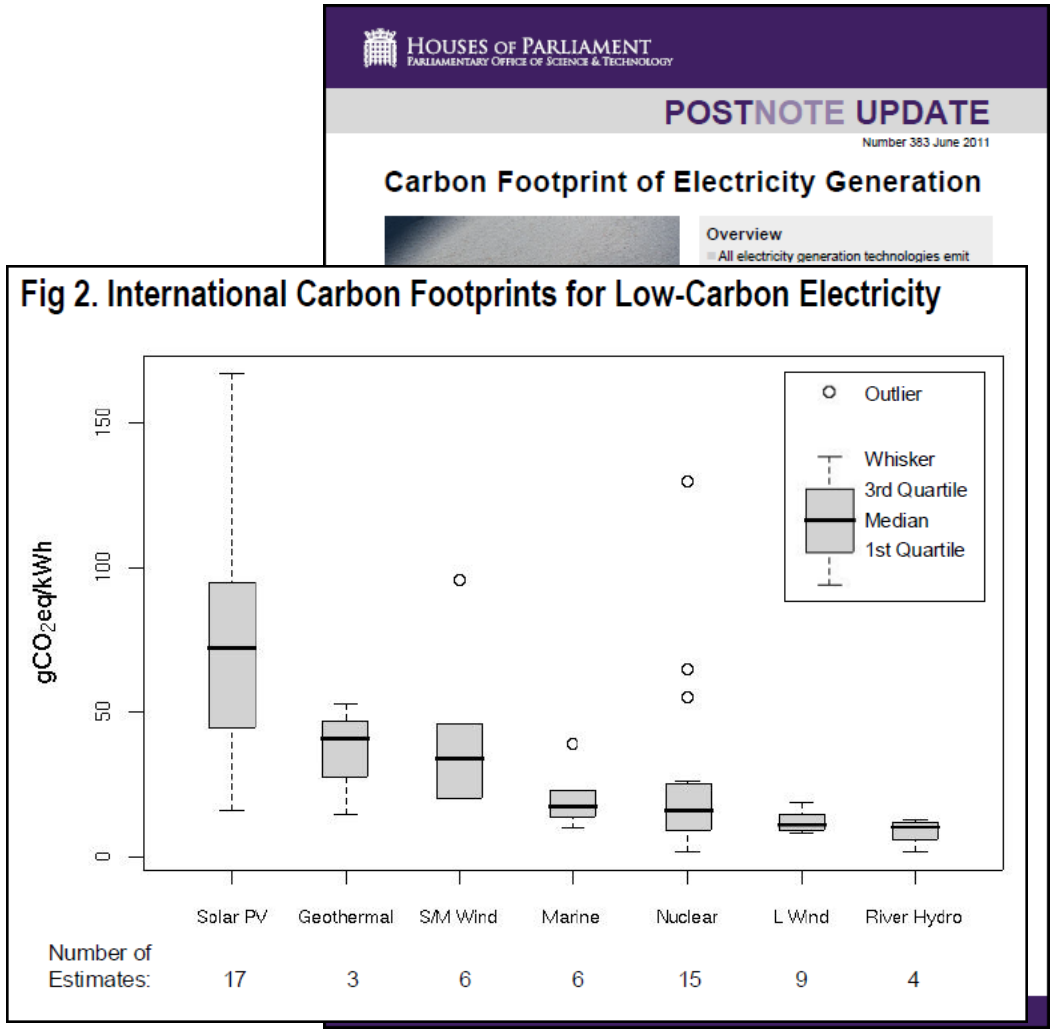
Example: Carbon Footprint POSTnote

Context:

- Debates were happening in Parliament on different technologies and the associated subsidy regime
- Aim to lower emissions (e.g. Climate Change Act 2008)

This POSTnote:

- Systematic review of the literature and published data
- Comparisons to help reader and give a sense of scale
  - E.g. 1990 electricity emissions, 2030 aspirations
- Numbers not adjectives
- Box plots as intuitive visual approach that show there isn't "one number"; gives spread and outliers
  - I have used similar approaches in industry
- Explained sensitivities (e.g. recycling credits)
- I was still asked for single numbers!



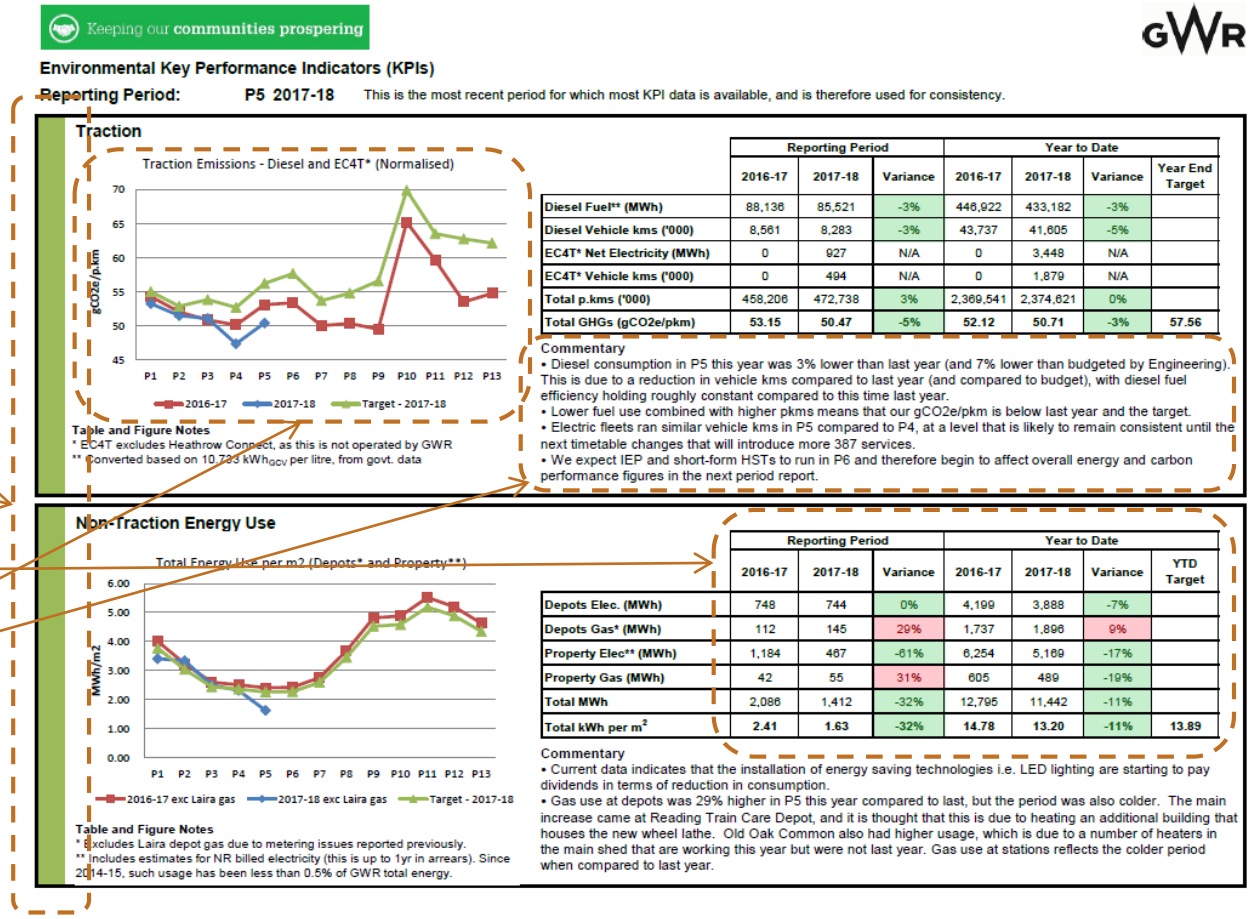
Reporting to Board of Directors

Context

- The Board of Directors requires a report on performance for every 4-week “rail period”
- They get hundreds of pages!
- They set targets aligned to franchise requirements

Key aspects:

- Red/amber/green flag on left hand edge to allow skimming
- Red/green cells to show increase/decrease
- Graph to give trends over time and against targets
- Short commentary with minimal jargon
- It is hard to reduce complex problems to simple stories! **Flagging issues simply with more detail in appendices helps**



Keeping our communities prospering

GWR

Environmental Key Performance Indicators (KPIs)

Reporting Period: **P5 2017-18** This is the most recent period for which most KPI data is available, and is therefore used for consistency.

Traction

Traction Emissions - Diesel and EC4T* (Normalised)

gCO2e/p.km

P1 P2 P3 P4 P5 P6 P7 P8 P9 P10 P11 P12 P13

2016-17 2017-18 Target - 2017-18

	Reporting Period			Year to Date			
	2016-17	2017-18	Variance	2016-17	2017-18	Variance	Year End Target
Diesel Fuel** (MWh)	88,136	85,521	-3%	446,922	433,182	-3%	
Diesel Vehicle kms ('000)	8,561	8,283	-3%	43,737	41,605	-5%	
EC4T* Net Electricity (MWh)	0	927	N/A	0	3,448	N/A	
EC4T* Vehicle kms ('000)	0	494	N/A	0	1,879	N/A	
Total p.kms ('000)	458,206	472,738	3%	2,369,541	2,374,621	0%	
Total GHGs (gCO2e/pkm)	53.15	50.47	-5%	52.12	50.71	-3%	57.56

Table and Figure Notes
* EC4T excludes Heathrow Connect, as this is not operated by GWR
** Converted based on 10.733 kWh_{GCV} per litre, from govt. data

Commentary
• Diesel consumption in P5 this year was 3% lower than last year (and 7% lower than budgeted by Engineering). This is due to a reduction in vehicle kms compared to last year (and compared to budget), with diesel fuel efficiency holding roughly constant compared to this time last year.
• Lower fuel use combined with higher pkms means that our gCO2e/pkm is below last year and the target.
• Electric fleets ran similar vehicle kms in P5 compared to P4, at a level that is likely to remain consistent until the next timetable changes that will introduce more 387 services.
• We expect IEP and short-form HSTs to run in P6 and therefore begin to affect overall energy and carbon performance figures in the next period report.

Non-Traction Energy Use

Total Energy Use per m2 (Depots* and Property**)

KWh/m2

P1 P2 P3 P4 P5 P6 P7 P8 P9 P10 P11 P12 P13

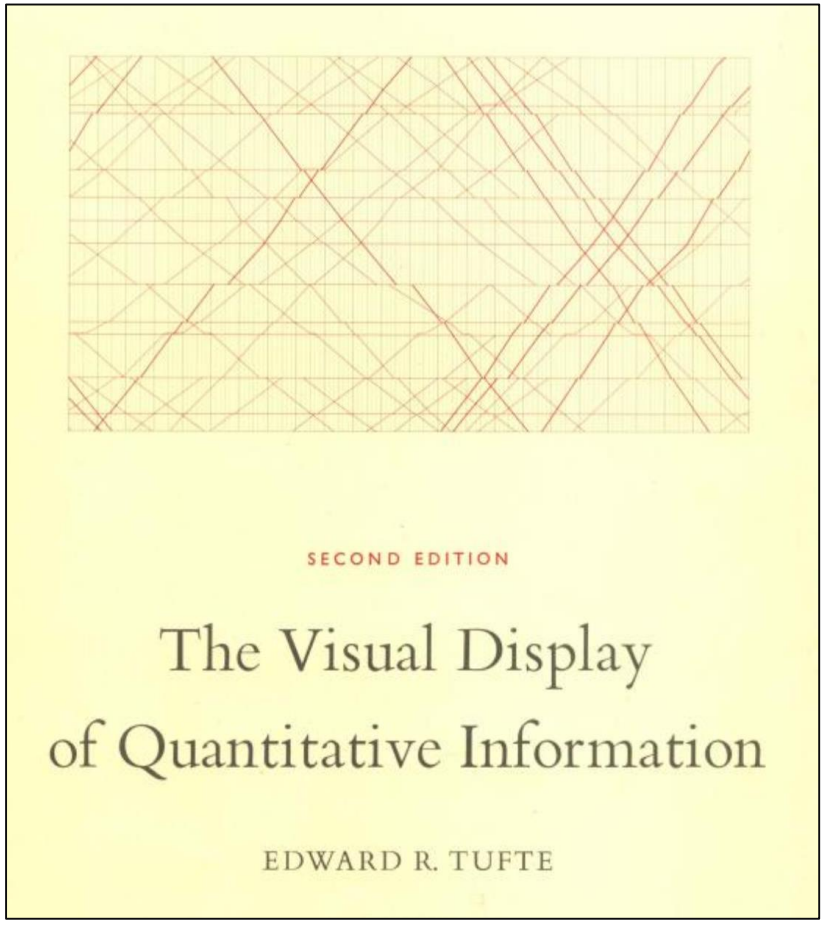
2016-17 exc Laira gas 2017-18 exc Laira gas Target - 2017-18

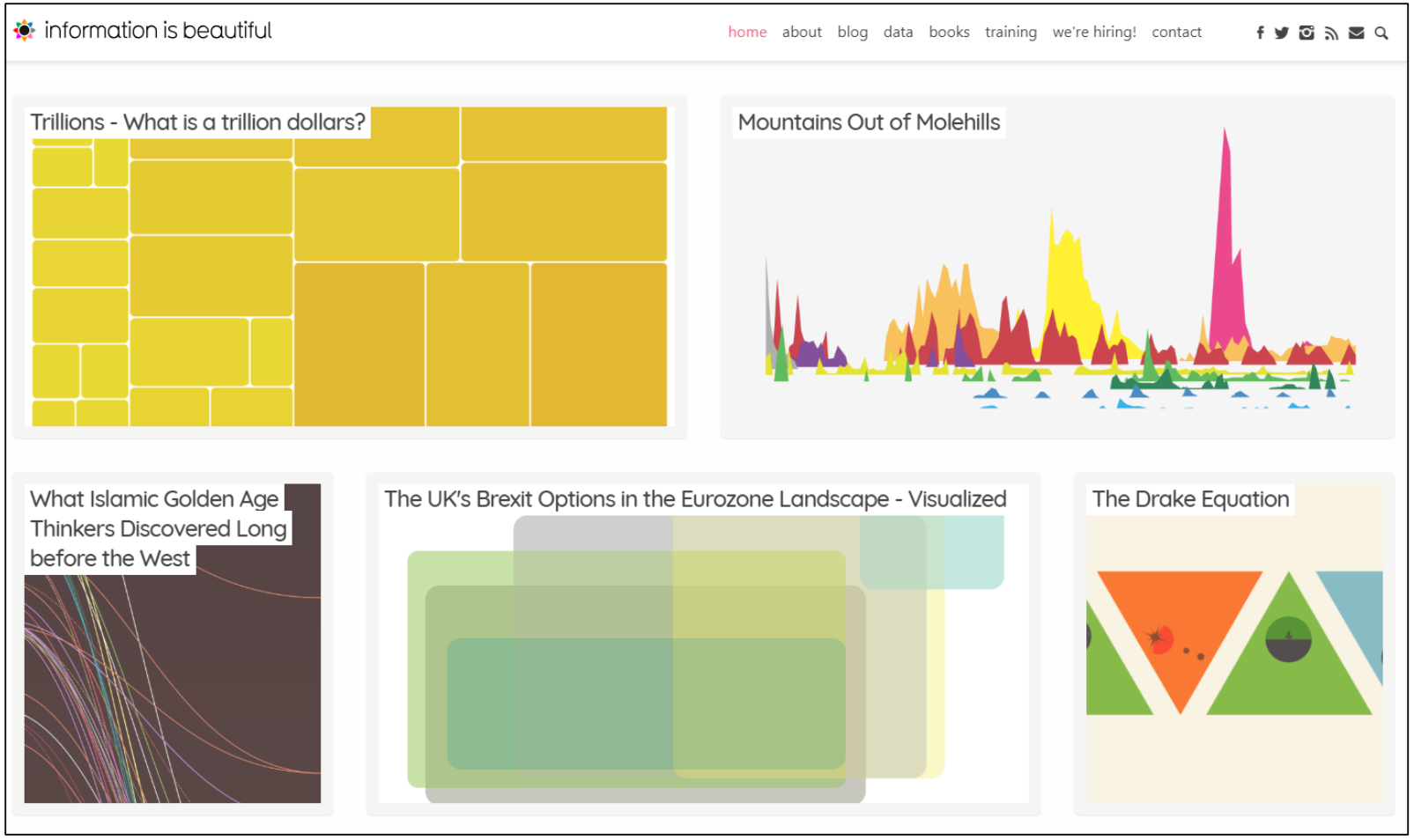
	Reporting Period			Year to Date			
	2016-17	2017-18	Variance	2016-17	2017-18	Variance	YTD Target
Depots Elec. (MWh)	748	744	0%	4,199	3,888	-7%	
Depots Gas* (MWh)	112	145	29%	1,737	1,896	9%	
Property Elec** (MWh)	1,184	467	-61%	6,254	5,169	-17%	
Property Gas (MWh)	42	55	31%	605	489	-19%	
Total MWh	2,086	1,412	-32%	12,795	11,442	-11%	
Total kWh per m^2	2.41	1.63	-32%	14.78	13.20	-11%	13.89

Table and Figure Notes
* Excludes Laira depot gas due to metering issues reported previously.
** Includes estimates for NR billed electricity (this is up to 1yr in arrears). Since 2014-15, such usage has been less than 0.5% of GWR total energy.

Commentary
• Current data indicates that the installation of energy saving technologies i.e. LED lighting are starting to pay dividends in terms of reduction in consumption.
• Gas use at depots was 29% higher in P5 this year compared to last, but the period was also colder. The main increase came at Reading Train Care Depot, and it is thought that this is due to heating an additional building that houses the new wheel lathe. Old Oak Common also had higher usage, which is due to a number of heaters in the main shed that are working this year but were not last year. Gas use at stations reflects the colder period when compared to last year.

Inspiration





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Conclusions

Understand your audience; be relevant to them

Use a clear structure with signposting to add scanning

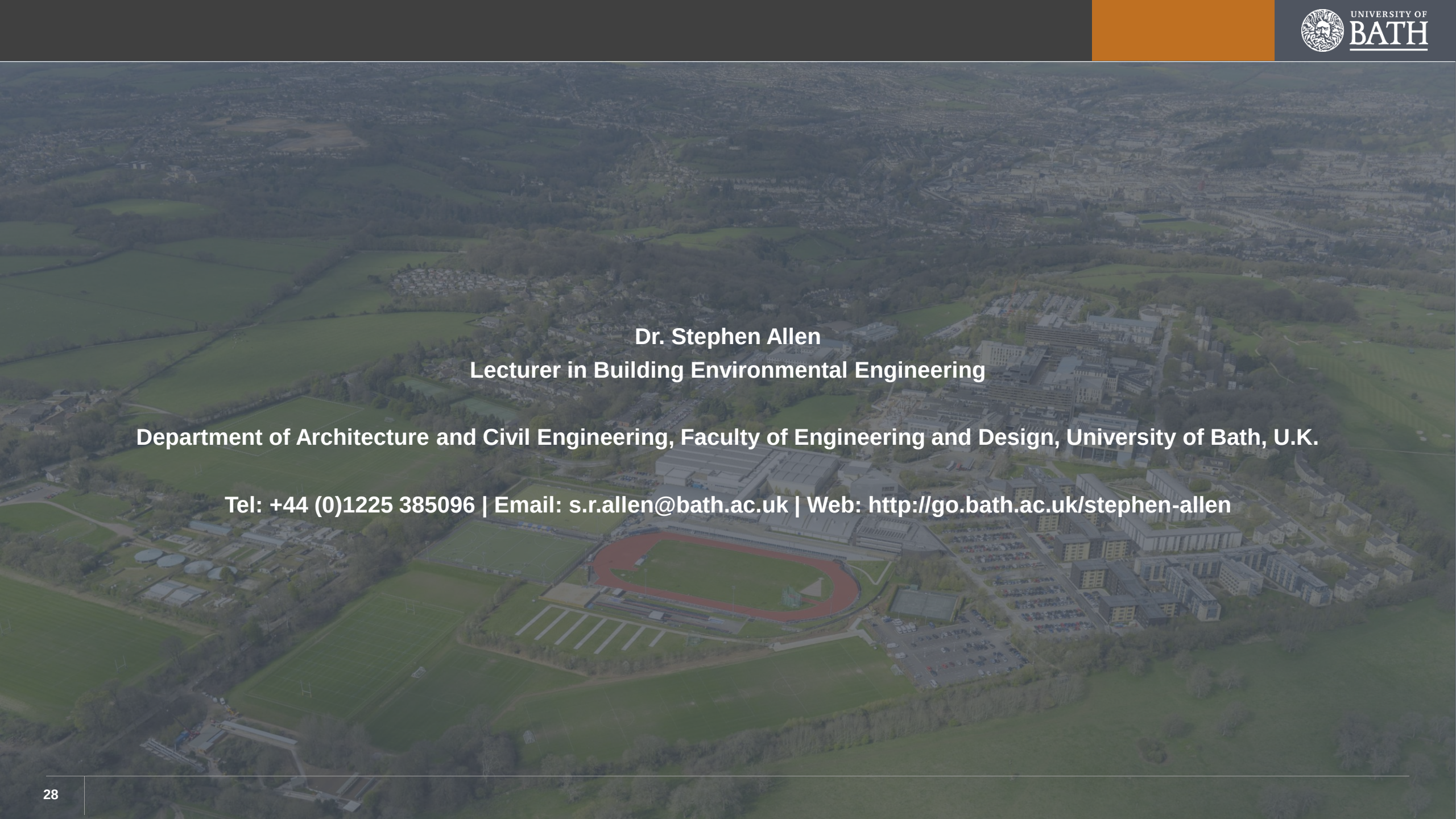
Use visuals to help convey uncertainty

Flag caveats and issues and use appendicies for further detail

To engage Parliament:

- Sign up to POST news and Select Committee enquiry announcements
  - Provide input where you can
- All Party Groups
- Also
  - Government evidence vs policy teams
  - Government consultations

If you'd like to discuss research collaboration please let me know!



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